NEURECTOMY OF THE SECOND DIVISION OF THE FIFTH NERVE.

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Of the sensory nerves affected with neuralgia, the branches of the second division of the fifth are most frequently involved, for in their course through osseous canals they are prone to be subjected to pressure, whilst their peripheral terminations are exposed to varying atmospheric influences.

In the two cases, notes of which I bring before the Society to-night, the posterior dental branches of the superior maxillary nerve appeared to be the starting-point of the pain. Both patients in their younger days had been addicted to alcohol and both had been accustomed to work in heated atmospheres. There is no history of syphilis in either case.

J. L—, æt. 50, came under notice July 19th, 1882.

History.—Fourteen years ago, after a heavy drinking bout, suddenly felt severe pain in the upper molar teeth of the right side, this being accompanied by a series of fine colours (blue, red, green, &c.) visible only to the eye on the affected side. There were no decayed teeth, but as the pain persisted the last upper two molars, supposed to be the exciting factors, were removed; this procedure

afforded no relief. Paroxysms of pain have been of constant occurrence since the first onset; the pain is described as being of a jumping character of short duration. Of late years the attacks, when they occur, have lasted longer. Sometimes the spasms are felt only five or six times daily, at others they follow in quick succession for the entire twenty-four hours. Atmospheric influences more readily affect them than anything else, exaggeration taking place in cold wet weather. Talking and movements of the jaw during mastication will also act as irritant causes. The patient has endeavoured to follow his employment at intervals, but not very successfully; for the last six months he has been quite incapacitated, and owing to disturbed sleep and constant pain there has been a considerable loss of flesh. The man has been an inmate of various hospitals and has been dismissed as incurable. Many drugs have been tried, and with the exception of opium have failed to procure relief; the same may be said of blistering, cauterization, and galvanism.

I treated the man as an out-patient of the Birmingham General Hospital for six weeks, and in September, 1882, admitted him.

It was then seen that the description of the pain had not been exaggerated; that the first sensations of a painful paroxysm were referred to the periphery of the posterior dental branches of the second division of the right trigeminus, at the point where the molar teeth had been removed; the pain then seemed to pass up to the temporal fossa and was felt there and in the lower eyelid, by the side of the nose, in the cheek, and the upper lip. This course was nearly always exactly followed.

During an attack the right eye became injected and suffused, the tears streaming over the face. When it rained, or threatened to do so, the man used to roll upon the floor in his agony. Morphia subcutaneously only afforded relief for a very short time. The patient was a strongly built man with healthy viscera, and when free from pain had a good appetite.

October 3rd, 1882.—I performed the following operation: An incision was made from the inner to the outer canthus of the right eye along the floor of the orbit. Another longitudinal one was made from the centre of this through the substance of the cheek, curved at its lower extremity and terminating at the angle of the mouth on the right side. The flaps thus marked out were reflected, and a dissection made to expose the infra-orbital nerve as it emerged from its foramen. This having been laid bare, a half inch trephine was applied to the antrum and its anterior wall partly removed.[1] The posterior wall of the cavity was next partially removed by a quarter inch trephine and the spheno-maxillary fossa thus opened. At this period of the operation the hæmorrhage was profuse. The bony canal containing the infra-orbital nerve was next broken up by means of a small chisel and a pair of scissor-pliers. The nerve was then traced back with considerable difficulty to the spheno-maxillary fossa, the posterior dental branches divided, and Meckel's ganglion exposed. With a long curved pair of scissors the trunk of the second branch of the fifth nerve was divided in front of the foramen rotundum and taken away with the ganglion. An inch and three quarters of nerve was thus removed. The portion in front of Meckel's ganglion appeared quite healthy; that behind was red and injected, although the usual size.

The hæmorrhage at certain parts of the operation was severe, especially at the opening of the spheno-maxillary fossa. The wound was plugged with boracic lint, the end of the strip being brought out at the lower angle. The edges were then approximated by sutures.

There were no constitutional symptoms following the operation, and none of the old pain was experienced, although on the third day there was a heavy rainfall. By October 16th the wound had healed.

On testing sensation, patient states that the most

[1] After removing the anterior wall of the antrum a reflector and artificial light will greatly assist the operator.

numbed parts of the face are the right side of the upper lip, and the structures lying over the lower wall of the orbit on the affected side.

Along the side of the nose and on the cheek, external to the longitudinal incision, sensation is less marked than on the corresponding side, according to the idea of the patient as 1 to 2. On examination of the soft palate there was no evidence of sensation being more marked on one side of the uvula than the other. A month later the statement was made that the feelings of sensation in the face have been gradually reviving. At the present time, however, they do not equal those on the normal side. The patient has continued free from pain and follows his former occupation.

J. P—, æt. 46, warehouse packer, admitted to the General Hospital, December 27th, 1882.

History.—When young was a heavy drinker, and has worked much in hot rooms. Has had smallpox, typhoid fever, but denies syphilis.

Eleven years ago, while at work, experienced a severe jumping pain in the upper molar teeth of the left side. This was followed by a copious flow of tears from the eye on the same side. The painful spasm was subsequently repeated; at first it was momentary and only felt at intervals of some hours, but it soon occurred more frequently and would be repeated five or six times in an hour; the intensity of the pain was often so great that it would awaken from sleep.

It could be elicited by speaking, masticating, and walking rapidly, and always by washing the face with cold water. The removal of the upper molar teeth seemed to give relief for a short time, but the patient gradually lost flesh, appetite, and sleep, although vigorously treated by varying methods in various hospitals, by different private practitioners, and numerous quacks. The severity of the pain at last became so great that it compelled the man to lie continuously in bed.

On admission.—The patient was found to be pallid and emaciated, with an anxious careworn countenance. He was unable to eat solid food owing to the pain induced by movements of the jaws. To walk across the ward or to talk produced a paroxysm. Continuous pressure on the site of the upper left molar teeth would induce the same. The pain is referred to the left temporal fossa, to the eye. and the side of the nose. During an attack there was no manifest injection of the ocular vessels, and no epiphora.

February 9th, 1883.—An operation similar to that described in the last case was performed.

After laying bare the infra-orbital nerve, a spartan grass, such as is used for pipe-cleaning, was inserted into the infra-orbital canal to act as a guide. The anterior wall of the antrum was not very thick, but the cavity itself was abnormally deep. Profuse hæmorrhage followed removal of the posterior wall.

The posterior dental nerves were seen and divided, but owing to the bleeding and the depth of the antrum, Meckel's ganglion could not be distinctly defined. An inch and a half of the nerve trunk was exsected.

More constitutional disturbance followed the operation than in the preceding case, the patient experiencing a bad attack of nasal catarrh. By February 26th he was able to eat solid food without inconvenience, walked about, talked, slept, and felt no pain.

March 5th.—On testing sensation, it was found that on the affected side there was a diminution of sensibility along the side of the nose, the lower eyelid, and the left portion of the upper lip. In the soft palate no abnormal appearance can be detected.

The man now gains his own livelihood and continues well. Occasionally, he informs me, especially when the face is exposed to anything cold, a slight momentary twinge of pain is experienced, but this subsides immediately the irritant is removed.

July 1st, 1884.—Both patients remain well.

Carnochan, of New York, who was the first to advocate

this operation, thought it was best performed by making a V-shaped incision with the apex at the infra-orbital foramen. The nerve having been laid bare, a curved sharp-pointed bistoury was passed into the mouth and made to pierce the substance of the cheek at the apex of the V, and the parts were then divided to the angle of the mouth. As there seemed to be no great advantage obtained by opening the cavity of the mouth, while there were evidently a good many disadvantages, in my own cases the plan of procedure was so far modified as to leave the oral mucous membrane intact.

In Carnochan's article on "Exsection of the Second Branch of the Fifth Pair of Nerves"[1] the following sentence occurs:—"I believe that, in such aggravated cases of neuralgia, the key of the operation is the removal of the ganglion of Meckel or its insulation from the encephalon." This from a physiological point of view is a dubious deduction, for, according to Brown-Séquard, pinching of the ganglion in animals fails to produce any evident sensibility, and, according to Prevost, none at all, though tearing it from its normal situation gives rise to very acute pain, which, however, may be the result of laceration of surrounding sensory fibres.

Be this as it may, most surgeons who have followed Carnochan have destroyed Meckel's ganglion.

In a case operated upon by Billroth the body was not touched, but this surgeon says, "In similar cases I should consider the removal of this ganglion of importance."

In thinking over my first case the question of treatment by nerve-stretching, neurotomy, and neurectomy had to be decided. Nothing could be simpler than to stretch the infra-orbital nerve as it emerged from its canal on to the face, but Valentine and others have shown that the stretching of a nerve-trunk merely diminishes the reflex excitability of its peripheral termination, and the traction so exerted is not conveyed to the central origin of the nervous trunk. In both the cases here recorded, the commencement of the

[1] 'American Journal of Medical Sciences,' n. s., vol. xxxv (1858), p. 136.

pain was invariably referred to the periphery of the posterior dental branches, and it appeared very doubtful if the stretching would have any effect on slender branches at some distance from the extension point. By dissecting out the whole nerve it was reasonable to assume that the same result would certainly be effected as by the milder procedure, together with anything more favorable which complete removal might possibly afford.

With regard to von Langenbeck's plan of dividing the nerve in the spheno-maxillary fossa by passing a long tenotome beneath the external palpebral ligament and along the outer wall of the orbit, it seemed doubtful if the nerve-trunk could be divided for certain behind the posterior dental branches, and in fact the operation would be merely a cut in the dark. Besides, cicatricial contraction of the central stump might subsequently act as a renewing irritant, and removal of only a small piece of a nerve-trunk may finally end in a reproduction. I have had a case under my care in which the inferior dental nerve reunited after a quarter of an inch of its trunk had been exsected.

I have tabulated, excluding my own patients, 22 cases in which Carnochan's operation has been performed. The following is the result:

Temporary relief was obtained in all.

(4, 7, 12). In 3 relief appears to have been permanent.

(5, 6, 8, 15, 19, 20). In 6 relief appears to have been of long duration.

(9, 13, 16, 18). In 4 relief appears to have been of short duration.

(1, 2, 3, 10, 11, 14, 17). In 7 the ultimate result is doubtful.

In 2 sufficient time has not elapsed to enable a correct estimate to be formed.

The doubtful cases were lost sight of; in two of them no return of the pain had been noted in twenty and fourteen months; in two more for one year; in another complete relief as regards the pain proceeding from the

superior maxillary nerve. Two never returned for further treatment, no pain being felt after two months and one month respectively. There is no record of a fatal termination. I think with all fairness it may be assumed that some of the doubtful cases may be regarded as permanently relieved, for if there had been a relapse we should in all probability have heard of them again.

An operation for neurectomy of the superior maxillary nerve, not at present much known in this country, is that which has been devised by Professor Lücke, of Strasburg. An oval incision is made from a point just above the external canthus of the eye, passing at first backwards, then downwards and forwards, and terminating at the zygomatic process of the upper jaw. The masseter muscle is divided and the zygomatic arch sawn through anteriorly and fractured posteriorly. This piece of bone, with the temporal fascia attached to it, is turned upwards. By these means the spheno-maxillary fossa is reached and the nerve is cut as it emerges from the skull. The fractured bone is then replaced and the masseter muscle attached to it with sutures. Union of the bone shortly takes place. Professor Lücke informs me that he has performed this operation three times with satisfactory results. The drawback to it, however, is the contraction of the muscle which is apt to follow, leading to depressed cicatrices, and thus necessitating prolonged after-treatment.

To obviate this difficulty Professor Lossen, of Heidelberg, has modified the operation by dividing the temporal fascia along the upper edge of the zygoma, then, after fracturing the bone, turning it backwards with the masseter left intact. After replacement of the bone, the temporal fascia is stitched in its old position, and the masseter is unable to draw the bony fragment downwards. In ten or twelve days the patients are able to open the mouth slightly, and eventually the full movement of the inferior maxilla is restored; but little deformity results as linear cicatrices mark the lines of incision. Braun, in the 'Centralblatt für Chirurgie,' April 22, 1882, records five cases of

intractable neuralgia operated upon by this method with the following results:

Case 1.—Man, æt. 40. Pain of four years' duration. Remained well two and three quarter years after operation.

Case 2.—Man, æt. 62. Pain of eight years' duration. Remained quite well for nine months, then paroxysms returned, but were less frequent and less severe than before the operation.

Case 3.—Man, æt. 46. Duration of pain not stated. No return of pain for ten months. Then a paroxysm was induced by very cold weather, but soon disappeared and has not reappeared. (Date of operation, February 3, 1881.)

Case 4.—Woman, æt. 42. Pain of nine years' duration. No return in nine months.

Case 5.—Man, age not stated. Pain of twenty-two years' duration. No return in four months.

Reyher, of St. Petersburg, reports the case in the 'Centralblatt für Chirurgie,' Sept. 2nd, 1882, of a woman, æt. 72, very stout, with neuralgia of the right trigeminus commencing thirteen years before. Had had neurectomy performed by Wegner's method, and neurotomy according to von Langenbeck, the operations giving relief for three years and two years respectively.

Reyher operated by first tying the right common carotid artery and then cutting away the nerve, according to the plan of Lossen, as it emerged from the foramen rotundum, this being rendered easy by the absence of bleeding. Seven weeks afterwards she is reported to be free from pain and the zygoma to be consolidated.

Nussbaum and Billroth have also cut away portions of the superior maxillary nerve by means of Langenbeck's osteo-plastic resection of the upper jawbone, and, still more recently, Gerster ('New York Medical Journal,' January 12, 1884) has advocated a modification of this procedure, by sawing through the middle of the malar bone. He thinks that by so doing access to the more central portion of the nerve is best obtained; he has so operated on three occasions.

Tabulation of Cases.

Operator.	Sex and age.	Duration of disease.	Date of operation.	Duration of relief.	Remarks.	Reference.
1. Carnochan	Man, 69	5 years	Oct. 15, 1856	No return of pain in 14 months	Superior maxillary nerve trunk found to be vascular, engorged, and thickened. Pain commenced in infra-orbital nerve	American Journal of Med. Sciences, Jan., 1858.
2. Carnochan	Man, 54	29 years	Oct. 10, 1857	No return in 7 weeks	For last 9 years pain had been continuous. Commenced in infra-orbital nerve. This had been divided by Chelius and other surgeons	Ditto.
3. Carnochan	Woman, 55	6 years	Nov. 5, 1857	No return in 1 month	Pain commenced in infra-orbital nerve	Ditto.
4. Wood, J. R.	Man, 42	Several years	April 2, 1866	No return in 2 years	Patient was lost sight of	New York Med. Journal, June, 1879.
5. Wood, J. R.	Woman, age not stated	Not stated	Sept. 29, 1869	9 months	Pain returned in inferior dental nerve. A portion of this removed, and after many months no return of pain	Ditto.
6. Wood, J. R.	Man, age not stated	5 years	June 29, 1870	„	Pain returned in inferior dental nerve. A part of this was removed with relief. In 1875 man returned addicted to opium, stating pain had reappeared. Died in 1875.—P.M. showed foramen rotundum closed by bone. No central changes in nerve origin	Ditto.
7. Wood, J. R.	Man, 50	10 years	Oct. 26, 1873	3 years	Patient was lost sight of	Ditto.

8. Blackman	Woman, 35	14 years	Jan. 24, 1868	20 months	Portion of infra-orbital nerve and the whole of the inferior dental had been removed previously. After return the paroxysms were as severe as ever	American Journal Med. Sciences, July, 1869, and Oct., 1870.
9. Mussey	Man, 32	5 years	June 11, 1869	2 months	Pain returned in inferior dental nerve, part of which was removed, but in four months agony as great as ever	American Journal of Med. Sciences, Oct., 1869, and Oct., 1870
10. Carson (Middleton)	Not stated	Not stated	Not stated	1 year	—	Blackman, Amer. Journ. Med. Sci,. Oct., 1870.
11. Schuppert (New Orleans)	Man, age not stated	„	„	Pain returned in period not stated	Finally the carotid artery was ligatured and the facial nerve resected at styloid foramen. After one year no return of pain	Conner, American Journ. Med. Sci., Oct., 1870.
12. Schuppert	„	„	„	No return after several years	—	Ditto.
13. Foote (Cincinnati)	Not stated	„	„	Pain returned in 3 months. Moderately severe	—	Ditto.
14. Fowler, S. R.	Man, age not stated	18 months	„	Complete success as regards infra-orbital neuralgia	Reported that some pain is at times felt along the line of lower jaw and teeth	Proceedings Med. Society, King's County, 1877.
15. Cheever, D. W.	Woman, age not stated	Not stated	„	2 years	Pain returned as badly as ever in the cheek, temple, and lower jaw. Infra-orbital region free	Boston City Hosp. Reports, Second Series, 1877.

Operator.	Sex and age.	Duration of disease.	Date of operation.	Duration of relief.	Remarks.	Reference.
16. Thorndike	Man, age not stated	Not stated	Not stated	1 month	Pain limited to infra-orbital region	Ditto.
17. Wagner, A.	Woman, 35	14 months	„	No return in 20 months	—	Langenbeck's Archives, vol. xi.
18. Wagner, A.	Woman, 45	23 months	„	Pain returned in 3 months	Neurectomy of infra-orbital previously performed. Central cause suspected	Schmidt's Jahrbücher, Band 146.
19. Weir, R. F.	Man, 47	24 years	Jan. 23, 1881	Remains free	Wagner's operation had been previously performed.	New York Med. Journal, Jan. 12, 1884, and private letter.
20. Markoe	Man, 30	Not stated	Dec., 1866	3 years	Neurectomy of inferior dental previously. In three years supra-orbital neuralgia appeared, but not severe	Ditto.
21. Howe	Woman, 45	12 years	May 29, 1883	Remains comparatively free	—	Ditto.
22. Gerster	Man, 36	18 years	June 16, 1883	„	Osteoplastic resection of upper jaw, and $1\frac{7}{8}$ inches of superior maxillary nerve removed two years before	Ditto.
23. Chavasse	Man, 50	14 years	Oct. 3, 1882	Remains free	—	—
24. Chavasse	Man, 46	11 years	Feb. 9, 1883	„	—	—